

# **Selden Arcade Explosion**

## **April 17, 2015 7:59PM**

### **Origin and Cause**



January 27, 2016

The purpose of this Origin and Cause report is to establish the final conclusions of the Norfolk Fire Marshal's Office investigation into the explosion at the Selden Arcade, which occurred on April 17, 2015.

#### **Background:**

- **Current Owner: City of Norfolk.**
- **Construction completed 1931.**
- **Construction: Fire Resistant.**
- **Fire protection: Sprinkler wet/dry system with monitored Fire Alarm system.**
- **Mixed use (Assembly, Studios, Offices, Mercantile).**
- **49927 Square Feet.**
- **2 Story above ground.**
- **Basement and crawl space located under the area of the electrical switch room, this does not go through the entire structure and is less than 2000 square feet, with a Sump pump in the basement.**
- **Electrical Powered 3 phase 208volt 1600 amp system.**
- **Electric Hot water heaters located throughout the Arcade.**
- **Natural gas supplied to the restaurant on the south west side, supplied from the meter bank attached to the parking garage adjacent to the arcade.**
- **HVAC is chilled and heated water system supplied from off site location.**
- **Multiple renovations: last completed January 2015 (Library, Bistro Connection).**
- **Electrical services, major upgrade 2005 (Final Inspection 11-17-2006).**

#### **Explosion**

The explosion occurs at 7:58pm and is witnessed by one of the two occupants present in the studio area of the arcade. The witness was in the open area when they saw the explosion come from the main electrical switch room area. The witness stated it looked like a scene from the movie "Titanic" with a wall of shattered glass flying across the arcade.

## **Fire Suppression / Investigation**

Upon entry to the structure no fire was found. Extensive damage was found from the main electrical switch room traveling north in the structure. Debris was thrown across the arcade from the main electrical switch room into the studios. Structural damage was found in the location of the main electrical switch room traveling from north to south in the structure. Structural damage was also found on the roof.

All damage was consistent with an explosion. It was noted that the damage emanated from the main electrical switch panel in the main electrical switch room. The sprinkler system was also damaged and water was being discharged from broken pipes and not the sprinkler heads. This water flow caused the basement to flood with approximately four feet of water prior to it being secured at the main water cut off.

## **Origin and Cause of the Explosion**

The investigation of this event took over six months. This involved over thirty interviews and extensive evidence processing and analysis. All laboratory testing, exam of the scene, and reports indicate the **origin** of the explosion occurred outside of the structure on the north east side at the site of the electrical power supply feed in the duct bank. This is the main 208 volt power feed to the electrical power switch room of the arcade which was struck by a contractor at 10:14am the same day. The explosion originated at this location traveling through the conduit and igniting the gases which had built up in the switch room causing an overpressure (explosion), blowing out the weakest points.

Arcing occurred at the point where the sewer pipe and electrical conduit meet, thus igniting the gases in the sewer line causing a flash fire in the sanitary sewer system with fire shooting out of the sewer cleanout at the origin point.

The **cause** of this explosion has been determined to be, due to a contractor striking the power line on the north east side of the structure causing arching of the wires at 10:14 am. This set a chain of events in motion that caused catastrophic failure of the electrical system that caused severe arcing and an explosion. This event can also be referred to as an arc blast. The gases being produced from the overheating and failing electrical cables in the conduit traveled into the electrical switch room building up to the explosive levels.

At 7:55 pm total failure of the cables inside of the conduit occurred at the location where the cables were struck earlier in the day. This caused the phases and ground wire to arc, creating temperatures within the conduit well above 2000 degrees Fahrenheit, thus melting and vaporizing the copper. The pressurized heat and gases traveled the path through the conduit under the main floor of the Selden Arcade over 250 feet to the switch room, this occurred instantaneously igniting the gases in the switch room. The enclosed area built up pressure instantaneously causing the failure of the structure in an explosive event. Also at the same time the insulation inside of the switch panel on the same conduit failed arcing to the grounded

conduit. The fire in the electrical switch room lasted only seconds not generating enough heat to activate the sprinkler heads in this area.

### **Conclusion of the Investigation**

The conclusion of the post blast investigation is that this was an explosion from the arcing wires and combustible / flammable gases generated during the failure of the conductors in the conduit. This event took over 9 ½ hours to reach the total failure of the conductors and the destructive occurring action. It was also concluded that the explosion was caused by an act of a person or persons, with no malicious intent found.

A handwritten signature in black ink, appearing to read 'SGT' followed by a stylized 'G' and a long horizontal line extending to the right.

LT Scott V. Gartner  
Arson / Explosives Investigator  
Hazardous Devices Technician  
Norfolk Fire Marshal's Office